

XI.—On the afternoon of the 25th a belt of pressure below the normal extended from Mexico to the British Possessions; bounded on the west by a line passing diagonally from Yuma through Arizona and Colorado to Cheyenne, and thence passing northwesterly through the eastern portions of Wyoming and Montana it stretched eastward over portions of the extreme northwest, the Missouri Valley, the northwestern border of the west Gulf states, and the Rio Grande Valley. The minimum pressure was over the middle and southern slopes. High areas existed over the Lake region, and in Oregon and Washington Territory. Light local rains had fallen in the region of minimum pressure and adjacent borders. The rapid advance of the high area from the Northwest and the high pressure eastward prevented for a time the development of sufficient energy to cause translation, contracted the area, causing it to assume the general outline of an inverted V, and forced the nucleus of minimum pressure southeastward towards the Gulf, south of San Antonio, Tex., and west of Corpus Christi, Tex., where it was located on the afternoon of the 26th. Frequent light local rains had fallen meanwhile throughout the Mississippi Valley, and still continued. As the high pressure on the east progressed towards the coast the depression began to move towards the northeast. The temperature at this time east of the Rocky Mountains, except in portions of Montana, Dakota, and Minnesota where the abnormal variations were slight, was below the mean, in some instances 18°. Copious local rains consequently continued in the region of the Mississippi from the Gulf northward to the British Possessions, and gradually extended eastward. The

centre of disturbance continued to move northeastward, crossed the Mississippi and passed into western Alabama on the afternoon of the 27th, thence trending first to the northward and afterwards to the northwest it passed through western Tennessee, and recrossing the river south of Cairo, Ill., passed into Missouri on the morning of the 28th. Curving crescent-like through the state, the maximum convexity reaching to about the centre, it again crossed the river near Keokuk, Iowa, on the night of the 29th, and at the morning report of the 30th was central in northwestern Illinois, to the southwest of Chicago. Trending thence more to the northward it crossed the lake diagonally to the coast of Michigan, north of Grand Haven, and at the last report on the night of the 30th was central near Grand Traverse Bay, Mich., apparently moving in a direction a few degrees east of north. No marked changes in energy occurred during its translation, but it was attended by abundant rains, the rain belt gradually extending to the east and northeast as the disturbance moved northward, so as to embrace the entire country to the coast south of the Saint Lawrence. By the night of the 31st the rains had ceased both in the west and south, and were confined mainly to localities in the Lake region, northern portions of the middle Atlantic states, and New England. Winds at the close of the month had begun to freshen on the Lakes, and in a few instances had reached velocities considered dangerous to navigation, but had not probably yet reached their maxima.

Another low area was at the midnight report on the 30th apparently central in the western Saskatchewan Valley, north of Montana.

NORTH ATLANTIC STORMS DURING SEPTEMBER, 1887.

[Pressure in inches and millimetres; wind-force by Beaufort scale.]

The paths of the depressions that have appeared over the north Atlantic Ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service;" and from other miscellaneous data received at this office up to October 21, 1887.

Nine depressions are traced, of which five were of tropical or sub-tropical origin; three advanced eastward from the American continent north of the forty-fifth parallel, and one first appeared over the British Isles.

Of the five depressions traced south of the thirtieth parallel, two are given a probable northerly track to the Banks of Newfoundland, from whence one advanced east-northeast to the British Isles; one moved westward over the Caribbean Sea and entered the Gulf of Mexico; one is first charted north of the western extremity of Cuba, whence it moved northeast to the European coast, and one advanced from the vicinity of the Bahama Islands to Nova Scotia and thence recurved eastward. Of the three depressions which advanced over the ocean north of the forty-fifth parallel, one united with a cyclonic area which had moved northward from the tropics; one disappeared northeast of Newfoundland, and one pursued an irregular course from the coast of Labrador and apparently dissipated over mid-ocean south of the fiftieth parallel. The depression which appeared over the British Isles on the 1st advanced northeast beyond the region of marine observations by the 2d.

During the first decade of the month the weather conditions were generally unsettled over the entire ocean, attending the passage of depressions numbers 1, 2, and 3. During the second decade fair weather prevailed over the eastern portion of the ocean, while in mid-ocean and over, and to the southward of, the Banks of Newfoundland stormy weather accompanied the passage of depressions numbers 4, 6, and 7. In the Gulf of Mexico the weather conditions were governed from the 18th to the 21st, inclusive, by depression number 5.

During the third decade the weather continued fine east of the fortieth meridian, while over the western portion of the ocean disturbances of small strength were occasioned by depressions numbers 8 and 9.

Compared with the storms traced for corresponding months of previous years, the depressions which appeared during September, 1887, were deficient in number and energy; the paths were confined to more southern latitudes, and while in the region west of the fiftieth meridian the aggregate number of cyclonic depressions of tropical origin somewhat exceeded the average for the month, there was a corresponding decrease in the number which passed eastward over Newfoundland, and an almost entire absence of storms of pronounced strength in high latitudes east of the fortieth meridian.

The following are brief descriptions of the depressions traced:

1.—This storm was central on the 1st between Cuba and southern Florida, whence it circled slowly northeastward to the thirtieth meridian by the 5th, after which it advanced rapidly northeastward and disappeared over the northern portion of the British Isles after the 8th. This depression displayed small energy during its passage off the Florida coast; with its advance over the ocean, however, it occasioned heavy rains and fresh to strong gales.

The following special reports refer to this depression: Capt. D. W. Storer, of the brig "Abbie Clifford," reports: "August 31st, 2.30 p. m., in N. 25° 10', W. 80° 00', a heavy squall from e., with heavy rain and very black weather; the wind died out as the rain ceased. At night the wind increased, and at midnight was blowing from ene., force 8. From the 1st to the 5th of September, between the above position and N. 28° 30', W. 80° 00', experienced unsettled weather, with frequent se. to ne. gales of force 7 to 8, and rain in squalls. Capt. C. W. Möller, of the s. s. "Geiser," reports a gale on the 7th and 8th, between N. 54° 44', W. 26° 32', at noon of the 7th, and N. 56° 39', W. 19° 24', at noon of the 8th; wind shifted from w. by s. to ssw., and veered to nw. by n.; lowest barometer, 29.25 (743.0), at midnight of the 7th, in N. 55° 46', W. 22° 50', when wind was ssw., force 9.

2.—This depression was central on the 1st in about N. 29°, W. 55°, whence it had apparently advanced from the tropics; by the 2d the storm-centre had moved northeast to the thirty-third parallel, in about W. 58°, from which position it circled northward to the Banks of Newfoundland by the 3d; by the 4th the depression had passed rapidly northeast to N. 52°, W. 30°, and by the 5th to N. 56°, W. 23°; during the next twenty-four hours the depression pursued an east-southeast course to the Irish coast, and by the 7th had advanced eastward beyond the region of observation. This depression was attended by disturbances of marked violence throughout its course, as is indicated by the following special reports:

Captain Shaw, of the ship "Inflexible," reports: "1st, in N. 33° 34', W. 56° 00', at noon, wind freshening and barometer falling; wind backed to ese. and then to e., blowing stiff breeze; heavy se. seas; 10 p. m., barometer falling rapidly; sea ese., with long roll; the sun rose and set like a ball of fire. 2d, 1 a. m., barometer falling, wind increased to a gale, and backing to ne.; 4 a. m., wind backing, barometer falling; rain and terrific squalls; the sea one mass of foam; 10 a. m., moderating, wind nw.; barometer rising; position at noon, N. 32° 21', W. 60° 10'." Capt. O. Olsen, of the bark "Hermon," reports: "2d, in N. 43° 10', W. 51° 29', at noon, s. and sse. wind and rapidly falling barometer. 3d, in N. 42° 2', W. 53° 48', at noon, wind drawing to ne., with heavy rain; 4 a. m., wind n., force 10; very heavy ssw. sea; barometer commenced to rise and wind moderated and drew to wnw."

Capt. C. W. Möller, of the s. s. "Geiser," reports: "1st, 7 a. m., in N. 43° 26', W. 59° 22', entered a fog bank, which continued without any clearings until the 3d, when it was dispersed by a cyclone which passed to the southward of the 'Geiser.' 3d, 8 a. m. (in N. 45° 50', W. 49° 45'), barometer 29.53 (750.0); wind s. by e., 5; dense fog. 10 a. m., barometer 29.39 (746.5); wind sse, 6; heavy rain. Noon (in N. 46° 20', W. 48° 58'), barometer 29.29 (744.0); wind se., 6; heavy rain. 1 p. m., wind ese, 7; heavy rain. 1.30 p. m., wind e. by n., 7; heavy rain. 2 p. m., wind ne. by e., 7; heavy rain. 3 p. m., wind ne., 9; heavy rain. 4 p. m. (in N. 46° 46', W. 48° 14'), barometer 28.86 (733.0); wind ne. by n., 9; heavy rain. 4.30 p. m., barometer 28.86 (733.5); wind nne., 10; rain moderating. 5 p. m., barometer 28.92 (734.5); wind nne., 10. 6 p. m., barometer 28.96 (735.5); wind n. by e., hurricane. 7 p. m., barometer 29.06 (730.0); wind n. by w., 10. After this the clouds broke and barometer rose rapidly and the wind settled into an ordinary gale from nw. by n. that continued two days, with a heavy sea."

Capt. J. J. Brarens, of the s. s. "DeRuyter," reports a hurricane on the 3d; wind backed from se. to e., ne., and nw.; lowest barometer, 29.10 (739.1), at 7.40 a. m., in N. 41° 16', W. 54° 54'. Capt. E. Smif, of the s. s. "Pieter de Coninck," reports a storm on the 3d; wind veered from sse. to sw.; lowest barometer, 28.48 (723.4), at 3 p. m., in N. 44° 48', W. 48° 08'. Capt. G. W. Koch, of the s. s. "Taormina," reports a hurricane on the 3d; wind veered from se. to nw.; lowest barometer, 28.44 (722.4), at 5.15 p. m., in N. 43° 48', W. 48° 17'. The s. s. "City of Rome" encountered a whole w. to nw. gale on the 4th; lowest barometer, 29.08 (738.6), at noon, in N. 50° 37', W. 35° 11'. On the 5th and 6th the depression was accompanied by heavy gales east of the thirty-fifth meridian.

3.—This depression apparently advanced from the ocean over the British Isles, where it was central on the 1st, with hard gales, and pressure ranging below 29.00 (736.6) off the southwest coast of Ireland; by the 2d the centre of depression had moved to the north of Scotland, without an appreciable decrease in energy.

The following special report refers to this storm: Mr. W. Grierson, observer on the s. s. "City of Rome," Capt. Hugh Young, commanding, reports: 1st, 7.30 p. m., barometer 28.82 (732.0), whole gale; 11.30 p. m., in N. 51° 15', W. 11° 35', barometer 29.15 (740.4), gale at its height, with high, dangerous sea and very heavy squalls; 2d, a. m., gale moderating.

Wind during gale from w., nw., and n., blowing hardest at nw., and backing to westward as gale moderated.

4.—This depression passed eastward over northern Newfoundland and was central at noon (Greenwich time) of the 11th in about N. 53°, W. 52°, with central pressure about 29.70 (754.4); by the 12th the storm-centre had moved east-northeast to about N. 56°, W. 42°, with an apparent decrease in pressure; by the 13th the depression had moved eastward to the thirtieth meridian. During the 14th and 15th the storm circled southward and then northward, and by the 16th had moved southeast to the forty-eighth parallel, after which it disappeared in the direction of the Spanish coast. The causes which influenced the abnormal direction of movement of this depression during the last three days of its course cannot be determined, owing to an absence of reports from the region to the eastward and northeastward of its position on those dates.

5.—This depression is given a probable track from east of the Windward Islands to Yucatan, the period embraced by its passage over the Caribbean Sea including the 11th and the 17th. During the latter date the storm moved northwest over Yucatan into the Gulf of Mexico, and advanced to the mouth of the Rio Grande River by the 21st. Owing to the limited number of reports received from the region traversed by this depression, its charted track over the Caribbean Sea is only approximately correct, and accurate data relative to its intensity cannot be given. With its advance over the Gulf of Mexico, however, it was accompanied by gales of hurricane force.

6.—This depression advanced southeastward over Newfoundland during the 16th and united with depression number 7 over the southern portion of the Banks of Newfoundland on the 17th. The storm did not possess marked individual energy and was drawn southward by the more powerful depression which advanced from the southward.

7.—This depression was of tropical origin, and moved northward in the vicinity of the fifty-fifth meridian during the 15th and 16th, attended by storms of hurricane force. During the 17th the centre of depression passed east of north over the Banks of Newfoundland, and during the 18th moved north of the fiftieth parallel and beyond the region of observation. The following special reports indicate the character of the disturbances occasioned by this cyclone during its passage over the Grand Banks:

Capt. N. Maass, of the s. s. "Marsala," reports a strong gale on the 16th and 17th; wind veered from se. to nw.; lowest barometer, 29.02 (737.1), at 9 p. m. of the 17th, in N. 45° 26', W. 50° 54'. The gale was accompanied by heavy rain, and fog prevailed until the passage of the storm-centre. Mr. J. Higgins, observer at Saint John's, N. F., reports: "strong ne. gale, with heavy rain, commenced on afternoon of the 17th; at 11 p. m. barometer fell to 29.31 (744.5); gale increased and continued till the morning of the 18th, when it veered to uw. and moderated." This gale caused considerable damage to shipping along the Newfoundland coast, and the Banks fishing fleet suffered severely.

8.—This depression passed eastward over the northern portion of Newfoundland, and was central on the 23d in about N. 50°, W. 53°, after which it moved northeast beyond the region of observation. During the 22d fresh gales were reported south of Nova Scotia, and on the 23d fresh to strong gales were encountered over the Banks of Newfoundland.

9.—This depression first appeared northeast of the Bahamas on the 24th, with central pressure about 29.70 (754.4), whence it advanced rapidly to Nova Scotia by the 25th, where pressure ranging below 29.70 (754.4) was shown; by the 26th the centre of depression had circled southeast over the ocean, and during the next three days it moved slowly northeast, with a moderate display of energy.

OCEAN ICE.

On chart i are also shown the positions in which icebergs and field ice were reported during September, 1887. These positions are determined from reports furnished by ship-

masters, and from data collected by the Signal Service agencies.

The easternmost and southernmost ice reported was a large berg, passed on the 1st, in N. 45° 37', W. 40° 50', by the s. s. "Jesmond." On the 8th a quantity of drift-ice was encountered over the northeast part of the Banks of Newfoundland, and on the 18th and 28th icebergs were observed in the Strait of Belle Isle. As compared with August, 1887, there has been a very great diminution in the quantity of ice reported, as, excepting on one date, no icebergs or field ice were observed over any portion of the Grand Banks for September, while during the preceding month they were frequently encountered along the eastern and southern edges of the Newfoundland Banks. In the vicinity of Belle Isle the aggregate quantity of ice reported for September exceeded that of the preceding month.

As compared with September, 1886, there was a slight decrease, and while the reports for that month show that ice was more frequently encountered near and to the eastward of Belle Isle, the eastern and southern positions of isolated bergs or field ice were about eight degrees farther west and one degree farther north than in the corresponding month of 1887.

The following table shows the southern and eastern limits of the region within which ice was reported for September during the last five years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Lon. W.	Month.	Lat. N.	Lon. W.
September, 1883.....	48 25	47 10	September, 1883.....	49 01	44 33
September, 1884.....	46 06	53 21	September, 1884.....	47 39	49 14
September, 1885.....	45 40	48 22	September, 1885.....	48 40	46 27
September, 1886.....	46 40	53 00	September, 1886.....	48 00	48 40
September, 1887.....	45 37	40 50	September, 1887.....	45 37	40 50

Icebergs and field ice were reported during the month as follows: 1st, s. s. "Jesmond," in N. 45° 37', W. 40° 50', one large berg; 8th, s. s. "Polaria," in N. 46° 03', W. 49° 44', drift ice; 18th, s. s. "Lake Nepigon," in Strait of Belle Isle, three large bergs; 28th, s. s. "Iceland," from Charles Island, Labrador, to and in the Strait of Belle Isle, fifty or sixty bergs of all sizes.

FOG.

The following are the limits of fog-areas on the north Atlantic Ocean during September, 1887, as reported by shipmasters:

Date.	Vessel.	Entered.			Cleared.		
		Lat. N.	Lon. W.	Time.	Lat. N.	Lon. W.	Time.
1	S. S. Waesland.....	41 58	60 58	.....	41 46	61 42	.....
1	Fog at St. John's, N. F.	.....	.....	.....	.....	.....	.....
1	S. S. Britannic.....	43 00	59 06	.....	42 22	61 47	8 hours.
1-2	S. S. Switzerland.....	45 30	43 40	8 p. m.	43 20	51 19	Midnight.
1-2	S. S. Erin.....	44 30	51 03	.....	43 30	56 40	.....
1-2	S. S. Servia.....	46 25	45 03	.....	43 50	53 10	.....
1-2	S. S. Oxford.....	44 18	53 38	.....	43 12	58 35	.....
1-2	S. S. Island.....	42 30	60 11	.....	41 51	62 45	.....
1-3	S. S. Leerdam.....	45 53	47 11	4-30 p. m.	43 51	54 27	2-38 p. m.
1-3	S. S. Taormina.....	42 59	55 58	.....	43 48	48 17	.....
1-5	Sp. B. D. Metcalf.....	45 24	45 03	.....	44 10	49 45	.....
2	S. S. Ludgate Hill.....	47 44	47 55	.....	47 08	50 48	.....
2	S. S. Australia.....	42 26	56 50	.....	42 28	56 20	.....
2-3	S. S. Werra.....	46 48	43 24	.....	44 43	51 12	.....
6	S. S. Baltimore.....	44 12	52 10	.....	48 15	41 00	.....
6	Fog at St. John's, N. F.	.....	.....	.....	.....	.....	.....
6	S. S. Canada.....	45 57	47 16	.....	45 04	51 05	.....
6-7	S. S. Celtic.....	47 37	45 21	5-43 p. m.	45 46	50 43	11 a. m.
7	S. S. Australia.....	43 01	47 50	.....	42 50	50 30	.....
7-8	S. S. Polaria.....	45 30	52 20	.....	46 20	48 15	.....
7-8	S. S. Circeasia.....	51 12	39 43	.....	47 50	48 55	.....
7-9	S. S. W. A. Scholten.....	46 14	45 30	.....	43 03	57 37	.....
8-9	S. S. Lord Gough.....	48 40	41 46	.....	46 55	48 20	.....
9	S. S. Polaria.....	47 45	41 40	.....	48 58	27 40	.....
9	S. S. Cephalonia.....	50 29	26 32	.....	47 19	42 46	.....
9	S. S. Scandinavian.....	49 54	42 42	.....	49 26	44 36	.....
9	S. S. Main.....	47 47	42 29	4-30 a. m.	47 26	44 13	9-30 a. m.
9	S. S. Elder.....	47 54	42 07	.....	47 32	43 53	.....
9-11	S. S. Britannic.....	44 00	52 04	.....	46 48	43 32	.....
10	S. S. Amalfi.....	48 41	44 28	.....	47 16	50 26	.....
10	S. S. Arizona.....	48 43	39 42	.....	49 08	37 37	.....
10	S. S. Elder.....	46 00	48 45	.....	44 33	53 48	.....
10-11	S. S. Lord Gough.....	46 53	50 30	.....	43 50	56 50	.....
10-11	S. S. Scandinavian.....	47 34	50 03	.....	46 01	54 32	.....

Limits of fog areas—Continued.

Date.	Vessel.	Entered.			Cleared.		
		Lat. N.	Lon. W.	Time.	Lat. N.	Lon. W.	Time.
11	S. S. Main.....	44 16	54 31	1-20 a. m.	44 00	55 23	6-30 a. m., at intervals
14	S. S. Scandinavian.....	42 26	68 32	.....	42 20	69 52	.....
14	S. S. Alamo.....	39 25	74 05	.....	38 00	74 30	.....
14-15	Sp. B. D. Metcalf.....	40 30	69 25	.....	40 02	71 15	.....
15	S. S. Cephalonia.....	42 37	64 46	.....	42 30	65 42	.....
15	S. S. Trave.....	41 30	66 35	.....	41 21	67 27	.....
15	S. S. Aurania.....	45 21	49 25	.....	44 28	53 11	.....
15-16	S. S. Buffalo.....	44 20	49 16	.....	43 45	55 05	.....
15-16	S. S. LaChapagne.....	44 54	53 05	.....	43 23	59 07	.....
16	S. S. Fulda.....	46 50	46 25	.....	44 30	54 30	.....
16	Fog at St. John's, N. F.	.....	.....	.....	.....	.....	.....
16-17	S. S. Dorian.....	43 05	51 25	10-30 p. m.	43 15	50 38	2-30 a. m.
16-17	S. S. Saint Ronans.....	46 09	48 19	.....	44 21	54 17	.....
16-17	S. S. State of Indiana.....	47 20	44 40	.....	43 40	51 20	.....
16-17	S. S. Westernland.....	47 26	44 36	.....	45 30	50 10	.....
16-17	S. S. Rugia.....	46 08	46 15	5 a. m.	44 36	51 27	7 a. m.
17	S. S. Dorian.....	43 34	49 20	8-30 a. m.	43 55	48 04	4 p. m.
17	S. S. Emsa.....	44 28	52 16	.....	45 48	47 33	.....
17	S. S. India.....	42 05	48 22	9-40 a. m.	42 09	50 36	9 p. m.
22-25	S. S. Hekla.....	51 45	38 06	.....	45 00	52 00	.....
23	S. S. Vaderland.....	46 54	48 06	.....	46 40	48 48	.....
23	Fog at St. John's, N. F.	.....	.....	.....	.....	.....	.....
23-24	S. S. Polynesia.....	47 15	46 20	.....	46 14	48 26	.....
23-25	S. S. Rotterdam.....	48 23	43 21	.....	44 41	54 25	.....
23-25	S. S. Vaderland.....	46 08	50 23	.....	45 44	51 39	At inter-vals.
24	Fog at St. John's, N. F.	.....	.....	.....	.....	.....	.....
24	S. S. Trave.....	44 57	52 27	.....	45 55	49 03	.....
25	S. S. Polynesia.....	44 50	53 20	.....	44 09	55 36	.....
25	do.....	46 23	47 32	.....	47 57	41 14	.....
25	Fog at St. John's, N. F.	.....	.....	.....	.....	.....	.....
25-27	S. S. Ohio.....	48 40	40 20	.....	45 18	53 20	.....
25-26	S. S. Main.....	42 52	52 19	.....	43 50	49 14	.....
25-26	S. S. Cephalonia.....	43 40	53 10	.....	44 20	55 56	.....
26	Fog at St. John's, N. F.	.....	.....	.....	.....	.....	.....
26	S. S. Hekla.....	44 40	53 30	.....	44 10	55 00	.....
26	S. S. LaChapagne.....	44 29	55 22	.....	44 46	53 54	.....
27	do.....	45 22	50 53	.....	45 38	49 31	.....
28	S. S. Devonla.....	49 50	44 22	.....	49 41	44 47	.....
29	S. S. LaBretagne.....	48 15	46 00	.....	48 05	47 00	.....

On chart i the limits of fog-belts to the westward of the fortieth meridian are shown by dotted shading.

As compared with the chart for August, 1887, the southern limit of fog reported in the vicinity of Newfoundland during September is shown to be about one-fourth degree farther south, while the eastern limit is appreciably extended to the northeastward. In the vicinity of Sable Island Bank fog was reported about one degree farther south than in August, while in the immediate vicinity of the coast of the United States several fog-belts of limited area appear, two of which occupy more southern positions than were given to fog-banks by reports rendered for August.

The development of fog in the vicinity of Newfoundland was confined to three periods, viz., from the 1st to the 11th, from the 15th to the 17th, and from the 22d to the 29th. During the 1st and 2d falling barometer and south to east winds prevailed in this region. On the 3d the advance of a cyclonic area over the Banks, and the consequent shift of wind to the northwest quadrant following its passage, occasioned a temporary disappearance of fog. During the 4th and 5th, however, the wind again shifted to the eastern quadrants whence it continued, attended by dense fog, until the passage of a depression which moved northeast off the southern edge of the Newfoundland Banks during the 6th. On the 6th and 7th there was a short intermission of fog accompanying the winds in the western quadrants of depression number 1. From the 8th to the 11th, inclusive, no well-defined storm-area advanced eastward over the Banks, and the south to east winds which prevailed, accompanied by fog, are attributed to the relatively low barometric pressure which prevailed to the northward of that region, which became more marked with the advance, on the 11th, of depression number 4 over northern Newfoundland.

From the 12th to the 14th, inclusive, the weather continued settled over the Grand Banks and no fog was reported. On the 15th a cyclonic area was central over the Gulf of Saint Lawrence, and on this and the two following dates, during which depression number 7 advanced from the southward and crossed the Banks, dense fog prevailed. From the 18th to the

21st, inclusive, the meteorological conditions continued normal, following the passage of depression number 7, and no fog was reported. During the 22d and 23d fog was occasioned by the passage of a cyclonic area over the Gulf of Saint Lawrence and northern Newfoundland, and from the 24th to the 29th, inclusive, fog attended the approach and passage of depression number 9.

In the vicinity of Sable Island Bank fog prevailed on the 1st, 2d, and 15th. On the 1st and 2d marked ranges in temperature, attending the intermingling of warm southerly and

cold northerly winds, occasioned rain and fog in that locality, and on the 15th the presence of cyclonic areas, one over the Gulf of Saint Lawrence and the other over the ocean to the southward, contributed to cause abnormal meteorological conditions. Fog was reported off the coast of the United States between the thirty-eighth and forty-third parallels on the 14th and 15th, and was apparently occasioned by the intermingling of warm southeast winds preceding, and cold northerly winds following, the passage of a cyclonic area over the Gulf of Saint Lawrence.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for September, 1887, is exhibited on chart ii by the dotted isothermal lines. In the tables of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature, precipitation, and departures from the normal, show respectively the averages for the several districts. The normal for any district may be found by adding the departure to the current mean for the district when the departure is below the normal, and subtracting when above. On chart iii the departures from the normal are illustrated by lines connecting stations of normal or equal abnormal values.

On the Pacific coast, in the Canadian Maritime Provinces, and along the central and western portions of the Gulf coast the mean temperature of September, 1887, is normal, or nearly so, the departures at a majority of stations not exceeding half of a degree. In the Rocky Mountain districts the month was decidedly warmer than the average, the departures from the normal temperature generally exceeding 2° over the southern districts, while over the northern they amount to, or exceed, 4°.

The most important feature of this month's temperature is the low monthly means in portions of the lower lake region, New England, and the middle Atlantic states, where the month averages from 4° to 6° colder than the normal, and it is worthy of note that this region coincides with that over which occurred the remarkably high mean temperatures of July, 1887.

The following are some of the most marked departures from the normal temperature at Signal Service stations, where the records cover eight or more years of observation:

Above normal.		Below normal.	
Red Bluff, Cal.....	5.4	Mount Washington, N. H.....	5.9
Boise City, Idaho.....	4.2	Albany, N. Y.....	5.7
Fort Buford, Dak.....	4.2	Saugus, Ontario.....	5.7
Fort Apache, Ariz.....	3.8	Baltimore, Md.....	5.3
Santa Fe, N. Mex.....	2.8	Philadelphia, Pa.....	5.0
Salt Lake City, Utah.....	2.7	Detroit, Mich.....	5.0
Deadwood, Dak.....	2.7	Lynchburg, Va.....	4.3
Cheyenne, Wyo.....	2.6	Rochester, N. Y.....	4.3

RANGES OF TEMPERATURE.

The greatest daily range of temperature was 52° at Saint Vincent, Minn., on the 29th; the maximum daily ranges exceed 40° over the region extending from the extreme northwest southward to central California and in the districts to the northward; along the Gulf coast they vary from 15° to 20°.

The least daily ranges along the coasts of the Atlantic, Gulf, and Pacific are less than 5°, while over the interior of the country east of the Rocky Mountains, except at stations on the Great Lakes, they increase to 10°, and to 20° at stations in the central Rocky Mountain region.

The monthly, and the greatest and least daily, ranges of temperature, at Signal Service stations are given in the tables of miscellaneous meteorological data.

The monthly ranges exceed 60° at Lynchburg, Va., at some stations in the extreme northwest, and over portions of the middle plateau and middle Pacific coast region; along the

Atlantic, Gulf, and Pacific coasts the monthly ranges are generally less than 40°, and at many stations are below 30°.

The following are some of the greatest and least monthly ranges at Signal Service stations:

Greatest.		Least.	
Fort Klamath, Oregon.....	67.0	Key West, Fla.....	16.3
Saint Vincent, Minn.....	66.9	San Diego, Cal.....	21.4
Huron, Dak.....	63.4	Fort Grant, Ariz.....	25.5
Poplar River, Mont.....	62.2	Tatoosh Island, Wash.....	27.0
Las Animas, Colo.....	61.2	Brownsville, Tex.....	27.2
Moorhead, Minn.....	61.0	Titusville, Fla.....	27.7
Winnemucca, Nev.....	60.4	Fort Bowie, Ariz.....	27.8
Boise City, Idaho.....	60.2	Cedar Keys, Fla.....	28.4
Lynchburg, Va.....	60.1	Corpus Christi, Tex.....	29.2

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperatures for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for September, 1887; (4) the departures of the current month from the normal; (5) and the extreme monthly means for September during the period of observations and the year of occurrence:

State and station.	County.	(1) Normal for the month of Sept.	(2) Length of record.	(3) Total for Sept., 1887.	(4) Departure from normal.	(5) Extreme monthly mean temperature for September.			
						Highest.		Lowest.	
						Am't.	Year.	Am't.	Year.
<i>Arkansas.</i>		°	Years.	°	°	°		°	
Lead Hill.....	Boone.....	72.2	6	72.8	+0.6	76.4	1884	67.5	1883
<i>California.</i>									
Sacramento.....	Sacramento.....	66.7	21	65.2	-1.5				
<i>Connecticut.</i>									
Middletown.....	Middlesex.....	61.3	29	57.8	-3.5				
New Haven.....	New Haven.....	62.7	101	59.7	-3.0				
Thompson.....	Windham.....	61.4	30	56.2	-5.2				
Waterbury.....	New Haven.....	63.1	12	57.0	-6.1				
<i>Dakota.</i>									
Webster.....	Day.....	63.1	5	57.9	-5.2				
<i>Illinois.</i>									
Aurora.....	Kane.....	64.3	9	63.5	-0.8				
Golconda.....	Pope.....	71.1	10	72.3	+1.2				
Greenville.....	Bond.....	68.9	9	68.0	-0.9				
Mattoon.....	Coles.....	67.6	7	67.3	-0.3	71.0	1880-'84	64.0	1880
Peoria.....	Peoria.....	66.8	32	68.6	+1.8				
Riley.....	McHenry.....	60.4	26	59.3	-1.1				
Sycamore.....	De Kalb.....	62.5	7	60.8	-1.7				
<i>Indiana.</i>									
Connersville.....	Fayette.....	65.1	6	65.4	+0.3				
Lafayette.....	Tippecanoe.....	64.8	8	64.8	0.0				
Logansport.....	Cass.....	65.8	33	66.7	+0.9	73.8	1881	61.1	1868
Sunman.....	Ripley.....	66.8	5	66.6	-0.2				
Vevay.....	Switzerland.....	68.7	21	68.5	-0.2				
Worthington.....	Greene.....	67.2	6	68.7	+1.5				
<i>Iowa.</i>									
Cresco.....	Howard.....	59.4	10	58.0	-1.4				
Monticello.....	Jones.....	61.5	34	61.0	-0.5	73.0	1865	51.0	1856
<i>Kansas.</i>									
Independence.....	Montgomery.....	69.8	15	69.8	0.0				
Lawrence.....	Douglas.....	66.4	20	67.6	+1.2				
Wellington.....	Sunman.....	69.4	9	73.2	+3.8	74.5	1884	63.8	1883
Yates Centre.....	Woodson.....	68.1	7	64.4	-3.7				
<i>Maine.</i>									
Belfast.....	Waldo.....	57.6	28	55.5	-2.1				
Cornish.....	York.....	59.8	30	55.2	-4.6				
Gardiner.....	Kennebec.....	58.4	51	55.0	-3.4				
Orono.....	Penobscot.....	57.3	19	54.5	-2.8				
<i>Maryland.</i>									
Cumberland.....	Alleghany.....	64.2	16	62.0	-2.2				
Fallston.....	Harford.....	65.8	17	61.6	-4.2	74.6	1881	61.3	1871